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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/565,435	01/20/2006	Tetsuya Hayashi	529.45793X00	2189
20457 7590 06/29/2007 ANTONELLI, TERRY, STOUT & KRAUS, LLP 1300 NORTH SEVENTEENTH STREET SUITE 1800 ARLINGTON, VA 22209-3873			EXAMINER BOR, HELENE CATHERINE	
			ART UNIT 3768	PAPER NUMBER
			NOTIFICATION DATE 06/29/2007	DELIVERY MODE ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

officeaction@antonelli.com  
dprater@antonelli.com  
tsampson@antonelli.com

**Office Action Summary**

Application No.

10/565,435

Applicant(s)

HAYASHI ET AL.

Examiner

Helene Bor

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 20 January 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 January 2007 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>01/20/2006</u>  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Acknowledgement of Preliminary Amendments***

1. For the record, acknowledgement is made of the applicant's preliminary amendments to the specification under 37 CFR 1.115.

### ***Acknowledgement for Invoking 35 USC § 112, Sixth Paragraph***

2. For the record, the examiner acknowledges the applicant for invoking 35 USC § 112, Sixth Paragraph, which states:

An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

As such, the claim limitations are being treated under 35 U.S.C. 112, sixth paragraph. However, if a claim limitation does not use the phrase "means for" or "step for," the examiner will not treat such a claim limitation under 35 U.S.C. 112, sixth paragraph.

### ***Drawings***

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: 1,3 & 6. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New

Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. Claim 1-8 & 11-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Izatt'463 et al. (US Patent No. 6,735,463) and further in view of Seo'371 (Re. 35,371).

**Claim 1:** Izatt'463 teaches a diagnostic apparatus with tomogram forming means forming a tomogram of a diagnosis portion of an examinee by transmitting/receiving an ultrasound wave to/from the examinee via a probe (Col. 2, Line 7-15). Izatt'463 teaches color Doppler image forming means forming a color Doppler image based on a Doppler signal obtained from the diagnosis portion (Figure 1,

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Element 57 & 68). Izatt'463 teaches image processing means performing image processing on the tomogram and the color Doppler image (Figure 1, Element 56).

Izatt'463 teaches display means displaying images obtained by the image processing means the tomogram and the color Doppler image being color displayed on the display means, wherein the image processing means causes the color Doppler image to be displayed transparently (Figure 1, Element 56 & Figure 13, Element 176 & Col. 4, Line 9-24). Izatt'463 fails to teach the use of ultrasound. However, Seo'371 teaches the use of ultrasound in blood flow detection (Col. 2, Line 47-49). It would have been obvious to one of ordinary skill in the art to combine the teachings of Izatt'463 and Seo'371 in order to create a device capable of detecting low flow velocity without decreasing the number of frames and degrading the image quality (Col. 2, Line 40-42).

**Claim 2/1:** Izatt'463 teaches a diagnostic apparatus, wherein the display means displays information composed of the color display and the transparent display (Figure 1, Element 74 & Col. 4, Line 9-24).

**Claim 3/1:** Izatt'463 teaches a diagnostic apparatus according to claim 1, further comprising selection means selecting one of the color display and the transparent display, wherein the display means displays the information selected by the selection means (Col. 4, Line 6-24).

**Claim 4/1:** Izatt'463 teaches a diagnostic apparatus, further comprising a transparency control means controlling a degree of transparency of the color Doppler image of the transparent display (Col. 12, Line 13-41 & Col. 5, Line 60-65).

**Claim 5/4/1:** Izatt'463 teaches a diagnostic apparatus, wherein the transparency control means controls a degree of the transparency based on blood flow information of the color Doppler image (Col. 12, Line 13-41 & Col. 5, Line 60-65).

**Claim 6/4/1:** Izatt'463 teaches a diagnostic apparatus, wherein the transparency control means controls a degree of the transparency based on a variance of a blood flow of the color Doppler image (Col. 5, Line 46 – Col. 6, Line 5).

**Claim 7/4/1:** Izatt'463 teaches a diagnostic apparatus, wherein the transparency control means sets the transparency of the color Doppler image in such a manner that the transparency is reduced with an increase in the variance of the blood flow (Col. 12, Line 59 – Col. 13, Line 22).

**Claim 8/4/1:** Izatt'463 teaches a diagnostic apparatus, wherein the transparency control means obtains the variance as a relative value to display the color Doppler image as: an opaque image when the variance is maximum; a transparent image when the variance is null; or a semi-transparent image when the variance is not maximum nor null (Col. 12, Line 13-41).

**Claim 11/4/1:** Izatt'463 teaches a diagnostic apparatus, further comprising luminance/hue control means controlling a hue of the color Doppler image of the color display, wherein the transparency control means and the luminance/hue control means control a luminance, a hue, and a transparency based on the blood flow information to create a three-dimensional color Doppler image (Col. 5, Line 55-59 & Claim 15 & 16).

**Claim 12/11/4/1:** Izatt'463 teaches a diagnostic apparatus, further comprising means for arranging a speed/reflection intensity and variance data of the Doppler signal

in each of three-dimensional voxels in accordance with a position of each of planes (Col. 5, Line 55-59 & Col. 14, Line 30-40). Izatt'463 teaches a diagnostic apparatus, further comprising means for deciding a luminance/hue of each of the three-dimensional voxels based on the speed and the variance (Claim 15 & 16). Izatt'463 teaches a diagnostic apparatus, further comprising means for deciding a transparency of each of the three-dimensional voxels based on the variance (Claim 15 & 16).

**Claim 13/11/4/1:** Izatt'463 teaches a diagnostic apparatus, wherein the display means displays a turbulence portion of the blood flow of the three-dimensional color Doppler image (Col. 5, Line 44-59).

**Claim 14/1:** Izatt'463 teaches a diagnostic apparatus, wherein the color Doppler image forming means comprises a phase comparator outputting a cosine component and a sine component of the Doppler signal (Figure 14, Element 186). Izatt'463 teaches a diagnostic apparatus, wherein the color Doppler image forming means comprises an autocorrelation calculation means calculating an average speed, a variance, and power of the blood flow (Claim 39). Izatt'463 teaches a diagnostic apparatus, wherein the color Doppler image forming means comprises a digital scan converter rearranging in accordance with a television scanning method (Col. 8, Line 12-22). Izatt'463 teaches a diagnostic apparatus, wherein the color Doppler image forming means comprises a color encoder performing colorization corresponding to the speed and the variance (Col. 13, Line 18-22). Izatt'463 fails to teach a MTI filter. However, Seo'371 teaches a MTI filter damping a low frequency component of the cosine component signal and the sine component signal and extracting a high frequency

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component of the cosine component signal and the sine component signal (Figure 6, Element 34a & 34b). It would have been obvious to one of ordinary skill in the art in order to remove unwanted components (Col. 4, Line 22-24).

**Claim 15/1:** Izatt'463 teaches a diagnostic apparatus diagnostic apparatus, comprising displaying a luminance/hue color bar representing a color of the color Doppler image of the color display, wherein the luminance/hue color bar changes in color in such a manner that: black is displayed at a portion corresponding to the blood flow speed of 0; the change in the case of a positive direction speed is displayed as a gradual change from dark red to orange and then to yellow in accordance with the increase in variance; and the change in the case of a negative direction speed is displayed as a gradual change from dark blue to light blue and then to green in accordance with the increase in variance (Col. 12, Line 13-41 & Col. 20, Line 59 – Col. 21, Line 8). Izatt'463 discloses the claimed invention except for the color differences. It would have been an obvious matter of design choice to change the colors, since the applicant has not disclosed that the color differences solves any stated problem or is for any particular purpose and it appears that the invention would perform equally well with either colors.

**Claim 16/1:** Izatt'463 teaches a diagnostic apparatus, wherein the image processing means comprises storage means storing data of a plurality of color Doppler images and reads out the data from the storage means to perform the image processing on the data of speeds, reflection intensities, and variances of the plurality of the color Doppler images (Col. 3, Line 22-43).



**Claim 17:** Izatt'463 teaches a diagnosing method comprising a step for transmitting/receiving a wave to/from an examinee via a probe and a step for forming a tomogram of a diagnosis portion of the examinee (Col. 2, Line 7-15). Izatt'463 teaches a diagnosing method comprising a step for forming a color Doppler image based on a Doppler signal obtained from the diagnosis portion (Figure 1, Element 57 & 68). Izatt'463 teaches a diagnosing method comprising a step for performing image processing on the tomogram and the color Doppler image (Figure 1, Element 56). Izatt'463 teaches a diagnosing method comprising a step for displaying the images which underwent the image processing, the tomogram and the color Doppler image being color displayed, wherein a step for displaying the color Doppler image transparently is further comprised (Figure 1, Element 56 & Figure 13, Element 176 & Col. 4, Line 9-24). Izatt'463 fails to teach the use of ultrasound. However, Seo'371 teaches the use of ultrasound in blood flow detection (Col. 2, Line 47-49). It would have been obvious to one of ordinary skill in the art to combine the teachings of Izatt'463 and Seo'371 in order to create a device capable of detecting low flow velocity without decreasing the number of frames and degrading the image quality (Col. 2, Line 40-42).

**Claim 18/17:** Izatt'463 teaches a diagnosing method comprising, further comprising a step for measuring a plurality of color Doppler images (Abstract). Izatt'463 teaches a diagnosing method comprising a step for arranging speed/reflection intensity and variance data of the color Doppler images in each of three-dimensional voxels corresponding to each of planes (Col. 5, Line 55-59 & Col. 14, Line 30-40). Izatt'463 teaches a diagnosing method comprising a step for deciding color information a

luminance/hue of each of three-dimensional voxels based on the speed and the variance (Claim 15 & 16). Izatt'463 teaches a diagnosing method comprising a step for deciding a transparency of each of the three-dimensional voxels based on the variance (Claim 15 & 16). Izatt'463 teaches a diagnosing method comprising a step for performing volume rendering based on parameters decided by the foregoing steps and creating a projection image to be displayed (Col. 5, Line 55-59).

7. Claim 9 & 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Izatt'463 et al. (US Patent No. 6,735,463), in view of Seo'371 (Re. 35,371) and further in view of Shiki'913 (US Patent No. 7,044,913 B2).

**Claim 9/1:** Izatt'463 teaches a diagnostic apparatus, wherein the display means displays a transparent color representing the transparency of the color Doppler image of the color display (Col. 4, Line 9-24). Izatt'463 and Seo'371 fail to teach the color bar. However, Shiki'913 teaches the color bar (Figure 11 (a), Element Color Bar & Col. 9, Line 54 – Col. 10, Line 15). It would have been obvious to one of ordinary skill the art at the time of the invention to combine the teachings of Izatt'463, Seo'371 and Shiki'913 in order to enhance diagnostic performance (Col. 10, Line 3-7).

**Claim 10/4/1:** Izatt'463 teaches a diagnostic apparatus, wherein the transparency control means displays the transparency color of which transparency is varied depending on the variance (Col. 5, Line 46 – Col. 6, Line 5). Izatt'463 and Seo'371 fail to teach the color bar. However, Shiki'913 teaches the color bar (Figure 11 (a), Element Color Bar & Col. 9, Line 54 – Col. 10, Line 15). It would have been obvious to one of ordinary skill the art at the time of the invention to combine the teachings of

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Izatt'463, Seo'371 and Shiki'913 in order to enhance diagnostic performance (Col. 10, Line 3-7).

### ***Conclusion***

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- a. Burdette, Everette et al. Real Time Brachytherapy Spatial Registration and Visualization System, April 10, 2007. US Patent No. 7,201,715 B2.
- b. Jibiki, Takao. Blood Flow Imaging Method, Blood Flow Imaging Apparatus and Ultrasonic Diagnostic Apparatus, June 24, 2003. US Patent No. 6,582,370 B2.
- c. Yamamoto, Masa et al. Ultrasonic Tomography which Sets Doppler Sample Point from Blood Flow Information, and Doppler Sample Point Setting Method, August 26, 2003. US Patent No. 6,610,014 B1.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Helene Bor whose telephone number is 571-272-2947.

The examiner can normally be reached on M-F 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eleni Mantis-Mercader can be reached on 571-272-4740. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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hcb

  
**BRIAN L. CASLER**  
**SUPERVISORY PATENT EXAMINER**  
**TECHNOLOGY CENTER 3700**